

The Relationship between Industrial Noise and Serum Lipid Profile In Electrical Station Workers.

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Abstract:-

Aim of this study obtained the effects of exposure to industrial noise on serum lipid profile in workers who are exposed to noise at work. The studied included 36 male workers as high level noise exposure in Babylon electrical station and 24 non workers as a control group, that aged 32-48 years in both them. Mean of serum Triglyceride (TG), total Cholesterol (TC), high density lipoprotein (HDL), low and very low density lipoprotein (LDL and VLDL) for exposure group were 179.92, 369.33, 56.76, 277.55 and 35.98 mg/dl but non exposure group were 102.84, 231.77, 57.79, 153.40 and 20.57 mg/dl respectively. Mean serum TG, TC, LDL and VLDL between two groups were different, this difference were statistically significant ($P=0.00, 0.00, 0.00$ and 0.00). There was no significant difference between two groups in HDL levels. This study did find a significant relationship between exposure to noise and serum lipid profile except HDL.

Keywords: Noise, Hyperlipidemia, Lipid profile, Cardiovascular disease

الخلاصة:

تهدف هذه الدراسة الى بيان مدى تأثير التعرض للضوضاء الصناعية على مستوى الدهون في مصال العمال خلال فترة العمل. شملت الدراسة 36 عامل تعرض للضوضاء في محطة كهرباء بابل و 24 شخص من غير العمال كمجموعة سيطرة كانت اعمار الاشخاص قيد الدراسة بين (32-48). حسب المعدل لكل من الدهون الثلاثية والكوليسترول الكلي والبروتينات الدهنية (HDL, LDL, VLDL) وكانت (179.92, 369.33, 56.76, 277.55, 35.98) بوحددة مليغرام /100 مللعمال، اما غير المتعرضين فان فكان المعدل لديهم (102.84, 231.77, 57.79, 153.40, 20.57) بوحددة مليغرام /100 مل. وجد بان هنالك فروقا معنوية في معدل كلا المجموعتين بالنسبة لـ (TG, TC, LDL, VLDL) حيث كانت قيمة (P-value) هي (0.00, 0.00, 0.00, 0.00)، كما بينت النتائج عدم وجود فرق معنوي في معدل قراءات HDL كوليسترول بين المجموعتين. من خلال هذه النتائج وجدت الدراسة علاقة بين تأثير الضوضاء ومستوى الدهون والبروتينات الدهنية مع اعداد HDL كوليسترول.

Introduction:-

Noise exposure is associated with several adverse pathophysiological effects such as acute and chronic hearing loss, hypertension and cardiovascular diseases⁽¹⁾. Noise is an important health that affects more than hearing, It may produce hurtful effect on human body and there is higher occurrence of digestive system disease⁽²⁾. Many studies have shown that noise influence the cardiovascular, endocrine, metabolic, gastrointestinal and neurological systems⁽³⁾. Hyperlipidemia is one of the main reasons for the development of various pathological conditions, these include psychological disorders such as depression, ailment and medical disorders including coronary heart diseases, hypertension and diabetes^(4,5). Lipids part from being the principal form of stored energy in most organisms play a variety of cellular roles, one of such lipids is triglycerides (TG) consist of glycerol and each molecule of which is esterified with three fatty acids, which store energy for body to use when it is needed, cholesterol (TC) a steroid that modulates the fluidity of eucaryotic membranes and also the prospect of steroid hormones such as progesterone, testosterone,

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estradioland cortisol^(6,7). Cholesterol and other lipids present in diets are transported in blood by lipoproteins, such as high-density lipoproteins (HDL or good cholesterol) carry cholesterol to the liver, where it is removed from the body, they are a separate group of lipoproteins that contain more protein and less cholesterol than low density lipoprotein (LDL)^(8,9). Very low density lipoproteins (VLDL) transport endogenous triglycerides from liver to cells, it consists of a lipid core of non-polar triacylglycerol and cholesteryl ester surrounded by more polar phospholipids, cholesterol and apolipoproteins that can solubilize the particle in the surrounding aqueous plasma⁽¹⁰⁾.

Cases:- 36 male workers exposure for noise in Babylon electrical station, aged 32-48 years and 24 non-workers, aged 32-48 years too as a controls group, blood samples were collected then serum was separated by centrifugation, the analytical determinations described below were either performed immediately, or serum was stored at -20°C and used within 72 hours.

Methods:-

Total cholesterol, HDL-cholesterol and triglyceride in the serum were measured by enzymatic method; with the Spinreact kit, Spain⁽¹¹⁻¹³⁾.

After the measurement of total cholesterol, triglycerides and HDL-cholesterol, LDL-cholesterol is calculated from the equation:-⁽¹⁴⁾

$$\text{LDL-C} = \text{TC} - \text{HDL-C} - \text{TG}/5$$

$$\text{VLDL} = \text{TG}/5$$

Statistical analysis:-

All results are expressed as a mean \pm SD (standard deviation), comparison between workers and non-workers were performed by the student's t-test. Person's correlations were used to determine relationship between parameters studied. A value of $p \geq 0.05$ was considered statistically significant.

Results and Discussion:-

The results were obtained association between industrial noise exposure and serum lipid profile level, TG, TC, LDL and VLDL, the data significantly increase in workers compared with non-workers. Table 1, 2, 3, 4 respectively.

Table 1- TG levels (mg/dl) in sera of workers and non-workers.

Subject	Number	Mean	SD	P-Value
Workers	36	179.92	6.29	0.00
Non Workers	24	102.84	26.26	-----

Stimulation of sympathetic nervous system during noise exposure increases the production of serum lipids and lipoproteins by altering serum lipid metabolic processes⁽¹⁵⁾. Catechol amines induce lipolysis and release free fatty acids into the circulation, free fatty acids in turn serve as substrate for the re-synthesis of triglycerides and later VLDL production by the liver⁽¹⁶⁾.

Table 2- TC levels(mg/dl) in sera of workers and non-workers.

Subject	Number	Mean	SD	P-Value
Workers	36	369.33	75.68	0.00
Non Workers	24	231.77	23.20	-----

Table 3-LDL levels(mg/dl) in sera of workers and non-workers.

Subject	Number	Mean	SD	P-Value
Workers	36	277.55	79.89	0.00
Non Workers	24	153.40	21.19	-----

Table 4-VLDL levels(mg/dl) in sera of workers and non-workers.

Subject	Number	Mean	SD	P-Value
Workers	36	35.98	1.26	0.00
Non Workers	24	20.57	5.25	-----

The significant more values of serum cholesterol, lowdensity lipoprotein and very low density lipoprotein inthe noise exposed group than in non-exposure groupare considered important observations of this studybecause of their pathogenetic implications⁽¹⁷⁾.Theseeffects are compatible with the lipolytic action ofadrenergic over activity that may increase themobilization of plasma free fatty acids fromadipose tissue and the formation of triglyceridesand cholesterol combining the lipoproteins,thesemodifications in the blood lipids found in this study may exert apathogenic action on cardiovascular system⁽¹⁸⁾.

Table 5- HDL-C levels(mg/dl) in sera of workers and non-workers.

Subject	Number	Mean	SD	P-Value
Workers	36	56.76	11.90	No sig.
Non Workers	24	57.79	5.50	-----

The measurement of total serum cholesterol is a useful indicator for predicting the risk of developing atherosclerosis in persons under age 50 yearswhereas HDL-cholesterol measurement is a better indicator than total serum cholesterol in persons over 50 years of age ⁽¹⁹⁾.While this study did not find a statistically significant relationship betweennoise exposure and serum HDL.

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